Reconsideration of the above-identified application in view of the amendments above and the remarks following is respectfully requested.

Claims 1- 30 are in this case. Claims 1-30 have been rejected. Claims 1, 2, 6, 8-10, 13, 16, 19-23 and 26-30 have now been amended. Claims 5, 7, 12, 17, 18, 24 and 25 have now been cancelled.

Specification

The Examiner has objected to the specification because of the unclear phrase "fail to poses a removable transit peptide" on page 24, line 9, of the specification. The term "poses" is apparently an erroneous spelling of the word "possess". The specification has now been amended accordingly. No new matter has been introduced.

Drawings

The Examiner has objected to the drawings. Applicant wishes to point out that formal drawings have been submitted (acknowledgement of USPTO on Sept 26, 2001). That notwithstanding, corrected formal drawings are respectfully submitted herewith.

35 U.S.C. § 101 Rejections

The Examiner has rejected claims 16-20 under 35 U.S.C. § 101, as being directed to non-statutory subject matter, stating that the claims are drawn to a nucleic acid molecule, i.e., a product of nature. Claims 17 and 18 have now been cancelled, rendering the Examiner's rejections moot with respect to these claims. Claims 16 and 19-23 have now been amended to recite "A nucleic acid construct...", and "The nucleic acid construct...", thus limiting the abovementioned claims to a nucleic acid intentionally fashioned to include the recited components, and not a product of nature, thereby overcoming the 35 U.S.C. § 101 rejections.., Support for such an amendment can be found, for example, on page 20, lines 12-15 of the instant specification: "As used herein

in the specification and in the claims section that follows, the term "nucleic acid molecule" includes polynucleotides, constructs and vectors. The terms "construct" and "vector" may be used interchangeably.". Further, detailed description of suitable nucleic acid constructs can be found from page 30, line 18 to page 32, line 7.

35 U.S.C. § 112, First Paragraph, Rejections

The Examiner has rejected of claims 1-30 under U.S.C. 112, first paragraph as containing subject matter that was not described in specification in such a manner as to enable one skilled in the art to make and/or use the invention commensurate in scope with these claims. The Examiner's rejections are respectfully traversed. Claims 5, 7, 12, 17, 18, 24 and 25 have now been cancelled, rendering the Examiner's rejections moot with respect to these claims. Claims 1, 2, 6, 8-10, 13, 16, 19-23 and 26-30 have now been amended.

In particular, the Examiner states that although being enabling for nucleic acids of SEQ ID NO:2, a method of enhancing Ci fixation in a plant transformed with such, and plants so obtained, the instant specification does not reasonably provide enablement for nucleic acids that encode a protein that is 70% homologous to the polypeptide of SEQ ID NO:3, a method of enhancing Ci fixation by transformation with such, and plants so obtained. Examiner further states that because the enzymatic identity of the gene of SEQ ID NO:2 remains in question, the only functional assay for these nucleic acids is their ability to enhance Ci fixation. The Examiner therefore concludes that since identifying nucleic acids functionally related to a given nucleic acid is highly unpredictable, undue experimentation would be required by one of ordinary skill in the art to make and/or use the invention as claimed.

The present invention is of a method of enhancing inorganic carbon fixation in photosynthetic plants, by transformation of plant cells with a gene enhancing bicarbonate uptake, which was identified and isolated by the instant

inventors from cyanobacteria, using targeted inactivation. As noted by Omata (Omata, T et al., PNAS USA 1999; 96:13571-576), "The genes for Ci transporters have been sought after, because of their potential for improving the nitrogen and water-efficiency of photosynthesis...", emphasizing the long felt need for, and importance of, isolated genes for enhancing Ci fixation. As correctly noted by the Examiner, the results disclosed in the Examples section of the instant invention clearly demonstrate impaired Ci fixation by mutant IL-2 strain of *Synechococcus* sp. strain PCC 7942 (see Table 1, and figures 4a and 4b), as compared to wild type, and superior Ci fixation at limiting concentrations of CO_2 in Arabidopsis plants expressing nucleic acids comprising isolated SEQ ID NO: 2 (see Table 2), of the gene isolated from the inactivated mutants.

In view of these results, Applicant is of the strong opinion that SEQ ID NO:2 encodes a bicarbonate transporter. That notwithstanding, to further define the claims of the present invention, and to expedite prosecution of this case, independent claim 1, has now been amended to recite:

> "A method of obtaining a photosynthetic plant characterized by enhanced inorganic carbon fixation, the method comprising:
>
> (a) transforming cells of photosynthetic plants with a nucleic acid construct including:
>
> (i) a polynucleotide capable of hybridizing under high stringency conditions to the nucleic acid of SEQ ID NO: 2, wherein said polynucleotide encodes a polypeptide having an inorganic carbon fixation activity; and
>
> (ii) a plant promoter operable in directing nuclear transcription of said polynucleotide; and
>
> (b) selecting from said photosynthetic plants of step (a) a photosynthetic plant comprising cells

having at least 5% enhanced inorganic carbon fixation as compared to otherwise similar, non-transformed cells of said photosynthetic plants;

thereby obtaining the photosynthetic plant characterized by enhanced inorganic carbon fixation."

thus eliminating the requirement for the polypeptide being identified as a bicarbonate transporter, and supported by the abovementioned Table 2. Similarly, claim 16 has been amended, now reciting:

"A nucleic acid construct for enhancing carbon fixation by a photosynthetic plant..."

and including the limitations:

" comprising:

(a) a polynucleotide capable of hybridizing under high stringency conditions to the nucleic acid of SEQ ID NO: 2, wherein said polynucleotide encodes a polypeptide having an inorganic carbon fixation activity; and

(b) a plant promoter being for directing transcription of said polynucleotide

wherein expression of said polypeptide in cells of the photosynthetic plant results in at least 5% enhanced inorganic carbon fixation as measured in comparison to otherwise similar, non-transformed cells of the photosynthetic plant."

Thus, independent claims 1 and 16, and claims depending directly or indirectly therefrom, now include the limitations of a nucleic acid construct comprising a polynucleotide defined by both physical ("high stringency hybridization to the nucleic acid of SEQ ID NO: 2"), and functional ("wherein said polynucleotide encodes a polypeptide having an inorganic carbon fixation activity") parameters, and the step of selecting exclusively plants expressing

the transforming nucleic acid construct.

Polynucleotides so defined are well-known art-recognized entities. For example, Kahn et al (US Pat No. 5,891,430) teaches a sequence encoding a diabetes related gene (rad), and constructs thereof, wherein the gene product is defined as a polypeptide "encoded by a nucleic acid that hybridizes under high stringency conditions to the nucleic acid of SEQ ID NO:1 or it's complement and having an activity of the ras/ GTPase gene family" (see claim 3). Staskawicz et al (US Pat No. 6,245,510) teaches the isolation and cloning of the Prf gene of tomato, a sequence encoding a member of the pathogen resistance gene class in plants: "An isolated nucleic acid comprising at least 1 contiguous nucleotides of a sequence that hybridizes to SEQ ID NO:1 or SEQ ID NO:3 under stringent conditions..." (see claim 2). A further example of a sequence defined by hybridization homology and function of it's gene product is taught in Gonez et al (US Pat No. 6,066,472), which discloses a novel protein tyrosine phosphatase from human glioblastoma cDNA, GLM-2: "An isolated nucleic acid molecule comprising: a) nucleic acid molecules which hybridize under stringent conditions to a nucleic acid molecule consisting of nucleotide SEQ ID NO:2, and which encode a naturally occurring GLM-2 protein tyrosine phosphatase, wherein said stringent conditions are hybridization at 50-65 degree C, 5XSSPC, 50%formamide, wash 50-65 degree C, 5XSSPC; or wash at 60 degree C, 0.5XSSC, 0.1%SDS..." (see Claim 1).

Methods of stringent hybridization, which select for polynucleotides having sequences with a high degree of (complementary) homology to the target sequences, are standard techniques, and are described in the instant specification on page 21, line 14, to page 22, line 2. Since many families of genes encoding functionally equivalent polypeptides embodying conservative changes are known to have 85% or even lower homology [such as the Alcohol Dehydrogenase (ADH) family (see: Deuster, G Eur J Biochem 2000;267:4315-4328) and the cytochrome c1 family (see cytochrome c1 at www.ExPASy.org, niceprot)] stringent hybridization can eliminate non-related

sequences of limited homology. Sequences having high degree of homology, but incapable of encoding polypeptides functional in enhancing inorganic carbon fixation are further excluded by the limitations "a polypeptide having inorganic carbon fixation activity" and the selection of transformed plants having "at least 5% enhanced inorganic carbon fixation". Thus, the abovementioned claims are clearly not "broadly drawn to a multitude of DNA molecules", but to a specific gene family with well-defined function.

Further support for such amendments can be found on page 39, line 15 to page 40, line 5, stating that: "According to a preferred embodiment of the present invention the transformed photosynthetic organism is characterized by a photosynthetic rate at least 5%, preferably 10%...as compared to a control non-transformed organism." Similarly, methods enabling selection of transformed photosynthetic plants by determination of enhanced inorganic carbon fixation are taught throughout the instant specification (see, for example, page 41, line 15 to page 42, line 19), providing an adequate written description of the claimed invention. Further, amended claims 1-30 are now restricted to photosynthetic plants, overcoming Examiner's rejection on the basis of lack of guidance for methods of transformation of photosynthetic organisms other than plants.

Thus, one of ordinary skill in the art, provided the teachings of the present invention, would be expected to be able to make and use the nucleic acid constructs and selection methods disclosed therein for obtaining photosynthetic plants having enhanced inorganic carbon fixation, with a reasonable expectation of success.

The Examiner has further stated that the recitation of "sequences encoding polypeptides that are 70% homologous to the polypeptide of SED ID NO:3...", as taught in the instant specification, is broadly drawn to a "multitude of DNA molecules", and therefore, not enabled by the instant specification. Similarly, the Examiner states that "making all possible single amino acid substitutions in a 467 amino acid long protein ...would require

making and testing 19^{467} possible variants", constituting undue experimentation. Examiner further states that "identifying nucleic acids functionally related to given nucleic acids is unpredictable", therefore identifying a gene encoding a polypeptide having least 70% homology to the polypeptide of SEQ ID NO:3 conferring enhanced inorganic carbon fixation, with a reasonable expectation of success, requires undue experimentation.

Applicant wishes to point out that the isolation of a gene, or a number of genes encoding sequences homologous to, and having equivalent biological function to a defined sequence, constituting a family of functional equivalents, is a well known, art recognized technique. One of ordinary skill in the art may employ any of a number of well-known approaches highly suitable for screening for homologous genes, such as ***Homology screening,*** using moderate to high stringency hybridization conditions to isolate cDNAs from other species (see, for example, U.S. Pat No. 6,391,550, to Lockhart et al. and U.S. Pat. No. 6,232,061 to Marchionni et al); ***PCR-based screening*** with specfic PCR primers designed and used to amplify homologous regions of DNA or reverse transcriptase products of mRNAs of a given tissue, cell or cell compartment, and screening of cDNA libraries with the amplification products; ***Differential display,*** in which homologous DNA sequences are isolated depending on their spatially and/or temporally differential expression; ***Functional cloning of transporters and channels,*** using sensitive electrophysiological assays to detect mRNA of expressed sequences encoding proteins with desired function; and ***Database screening*** employing global or local alignment algorithms, to identify families of homologous sequences of a cDNA of interest (i.e., ictB). Indeed, Gene Family Isolation Services have recently become commercially available (see, for example, Resgene "Gene and Gene Family Isolation Services", cat # SGT 1001, Invitrogen Corp; Cellular and Molecular Technologies, Inc at www.cmt.com; Pangene Corporation, Freemont CA; and Homologous Cloning Service of Evrogene JSC, Moscow, Russia), further simplifying identification and isolation of homologous gene

families. Further validation of putative homologous sequences can be effected according to selection criteria of biological activity, molecular weight, cellular localization, immune reactivity, etc. Thus, any one of ordinary skill in the art privileged to the teachings of the instant application would be capable of isolating mRNAs, or screening cDNA libraries to identify and generate constructs representing expressed sequences homologous to the polynucleotide sequence of the instant application without having to engage in undue experimentation.

To further define the claims of the present invention, and to expedite prosecution of this case, claims 6 and 19 have now been amended to included the limitation: "wherein said polypeptide having inorganic carbon fixation activity is at least 90% homologous to SEQ ID NO: 3...", and reference to "a portion thereof..." is no longer recited, thus restricting the claims to a clearly defined family of closely related polypeptides having high sequence homology and identical biological function. Support for this amendment is found throughout the instant specification, for example, page 22, line 17:

> "According to a preferred embodiment of the present invention the polypeptide is at least 60%, preferably at least 65%, more preferably at least 70%, still more preferably at least 75%, yet more preferably at least 80%, more preferably at least 85%, more preferably at least 90%, yet more preferably at least 95%, ideally 95-100% homologous (identical and similar) to SEQ ID NO:3...as determined using the Blast software where gap open penalty equals 11, gap extension penalty equals 1 and matrix is blosum 62".

In view of the above, it is Applicant's strong opinion that one of ordinary skill in the art, privileged to the teachings of the present invention, and employing any of the well known techniques described herein, could make and use the constructs of the present invention to generate and identify

photosynthetic plants characterized by enhanced inorganic carbon fixation without engaging in undue experimentation.

35 U.S.C. § 112, Second Paragraph, Rejections

The Examiner has rejected claim 1-15, 17-21 and 24 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicant regards as the invention. Claims 5, 7, 12, 17, 18 and 24 have now been cancelled, rendering the Examiner's rejections moot with respect to these claims. Claims 1, 2, 6, 8-10, 13, 16 and 19-23 have now been amended. The Examiner's rejections are respectfully traversed.

The Examiner has stated that claims 1 and 16 are indefinite in their use of the term "enhancing". The term "enhancing" has now been eliminated from amended claim 1, and claims 1 and 16 have now been amended to include the relative language:

> "...having at least 5% enhanced inorganic carbon fixation as compared to otherwise similar, non-transformed cells of said photosynthetic plants"

as recommended by the Examiner. Support for the "at least 5%" limitation can be found on page 39, line 15 to page 40, line 5. As further recommended, amended method claim 1 now includes the gerund verbs "transforming" and "selecting" in steps "a" and "b", respectively, the phrase "the steps of" is no longer recited, and there is now agreement between the preamble and method steps in claim 1, the method resulting in " ...a photosynthetic plant characterized by enhanced inorganic carbon fixation".

The Examiner has stated that claims 1 and 16 are indefinite in their recitation of "polypeptide having bicarbonate transporter activity". The identity of the polypeptide of the present invention, and the limitations of now amended claims 1 and 16 " a polypeptide having inorganic carbon fixation activity" are discussed hereinabove.

The Examiner has stated that the phrase "further includes", in claim 15, lacks antecedent basis in independent claim 1. Independent claim 1 now recites "a polynucleotide construct including:" (emphasis added), providing antecedent basis for the recitation of "further including" in dependent claim 15.

Claims 14 and 21 have now been amended to no longer recite the term "independently".

Claims 6 and 19 have now been amended to recite the phrase " Blast software" instead of "the Blast software".

Examiner has rejected claims 1-11 as being incomplete for omitting "a promoter for expression of the polynucleotide", amounting to a gap between the elements. Claim 1 has now been amended to recite: " a nucleic acid construct including: ...a polynucleotide...and a plant promoter operable in directing transcription of said polynucleotide...", as recommended by the Examiner. Support for such an amendment can be found throughout the instant specification, for example, on page 25, line 10: "a plant promoter located upstream of the polynucleotide and being effective in expressing the polypeptide".

In view of these amendments Applicant believes to have overcome the 35 U.S.C. § 112, second paragraph rejections.

35 U.S.C. § 102 (b) Rejections- Bonfil, et al.

The Examiner has rejected claims 16-20, and 22 under 35 U.S.C. § 102 (b) as being anticipated by Bonfil et al. Claims 17 and 18 have now been cancelled, rendering the Examiner's rejection moot with regard to these claims. Claims 16, 19, 20 and 22 have now been amended. The Examiner's rejections are respectfully traversed.

The Examiner states that Bonfil et al discloses a 4957 base pair-long nucleic acid from *Synechococcus* that encodes a gene with putative bicarbonate transport activity, which inherently contains a transcription signal and includes several promoters, and that the nucleic acid would "correspond to" a "portion derived" from SEQ ID NO:2, would hybridize to said portion, and would encode a protein that is at least 70% homologous to SEQ ID NO:3, and as such anticipates the nucleic acid of present invention

Applicant wishes to point out that the present invention is of a nucleic acid construct including a polynucleotide encoding a polypeptide having inorganic carbon fixation activity, and uses thereof for enhancing inorganic carbon fixation in photosynthetic plants. In stark contrast, the prior art nucleic acid is a polynucleotide sequence derived from cyanobacteria, without any demonstrated bicarbonate transport activity, devoid of the ability to direct nuclear gene expression in plants. Further, claim 16 has now been amended to recite "a nucleic acid construct for enhancing inorganic carbon fixation by a photosynthetic plant...", and that the expression of the polypeptide is via "nuclear transcription". Thus, independent claim 16, and claims directly or indirectly depending therefrom, are not anticipated by Bonfil et al. Further, Bonfil et al does not provide motivation for one of ordinary skill in the art to make or use a nucleic acid construct as recited in claim 16, for expressing a gene derived from the prior art sequence in a plant, since the function of the prior art gene was unknown at the time. Thus, claim 16 is neither anticipated nor rendered obvious by Bonfil et al.

The Examiner has stated that claims 23-27 and 30, and 23-25, 28 and 29 are rejected under 35 U.S.C. § 102 (b) as being anticipated by Ko et al, and Gordon-Kamm et al, respectively. Claims 24 and 25 have now been cancelled, rendering moot the Examiner's rejections with regard to these claims. Claims 23 and 26-30 have now been amended.

Claims 23-30 no longer recite "a transformed photosynthetic organism", but rather have now been amended to recite "transformed photosynthetic plant

comprising the nucleic acid construct of claim 16.", thereby specifically excluding all naturally occurring plants. Thus, amended claim 23, and amended claims 26, 27 and 30 directly or indirectly depending therefrom are neither anticipated nor rendered obvious by Ko et al or Gordon-Kamm et al.

Double Patenting

The Examiner has rejected claims 1-30 on the basis on obviousness-type double patenting as being unpatentable over claims 1-23 of U.S. Pat. No. 6,320,101. In compliance with 37 CFR 1.321 (c), and as suggested by the Examiner, a terminal disclaimer, drafted and signed as set forth in 37 CFR 1.130(b), is attached herewith, thus overcoming the rejection on the basis of non-statutory double patenting.

In view of the above amendments and remarks it is respectfully submitted that claims 1-4, 6, 8-11, 13-16, 19-23 and 26-30 are now in condition for allowance. Prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,

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Attorney for Applicant
Registration No. 25,457

Date: November 28, 2002.

Encl.:
Version with marking to show changes made;
A three months extension fee;
Terminal Disclaimer; and
Formal drawings.

VERSION WITH MARKING TO SHOW CHANGES MADE

In the Specification:

Please replace the paragraph beginning on page 23, line 5, with the following rewritten paragraph:

According to a preferred embodiment of the present invention, the polypeptide includes an N terminal transit peptide fused thereto which serves for directing the polypeptide to a specific membrane. Such a membrane can be, for example, the cell membrane, wherein the polypeptide will serve to transport bicarbonate from the apoplast into the cytoplasm, or, such a membrane can be the outer and preferably the inner chloroplast membrane, wherein the polypeptide will serve to transport bicarbonate from the cytoplasm to the intermembranal space and the stroma, respectively. Transit peptides which function as herein described are well known in the art. Further description of such transit peptides is found, for example, in Johnson *et al.* The Plant Cell (1990) 2:525-532; Sauer *et al.* EMBO J. (1990) 9:3045-3050; Meuckler *et al.* Science (1985) 229:941-945; Von Heijne, Eur. J. Biochem. (1983) 133:17-21; Yon Heijne, J. Mol Biol. (1986) 189:239-242; Iturriaga *et al.* The Plant Cell (1989) 1:381-390; McKnight *et al.*, Nucl. Acid Res. (1990) 18:4939-4943; Matsuoka and Nakamura, Proc. Natl. Acad. Sci. USA (1991) 88:834-838. A recent textbook entitled "Recombinant proteins from plants", Eds. C. Cunningham and A.J.R. Porter, 1998 Humana Press Totowa, N.J. describe methods for the production of recombinant proteins in plants and methods for targeting the proteins to different compartments in the plant cell. The book by Cunningham and Porter is incorporated herein by reference. It will be however appreciated by one of skills in the art that a large number of membrane integrated proteins fail to possess~~poses~~ a removable transit peptide. It is accepted that in such cases a certain amino acid sequence in said proteins serves not only as a structural portion of the protein, but also as a transit peptide.

In the Claims:

1. (Amended) A method of obtaining a photosynthetic plant characterized by enhanced~~ing~~ inorganic carbon fixation ~~by a photosynthetic organism~~, the method comprising ~~the steps of~~:

(a) transforming cells of ~~the~~ photosynthetic plants~~organism~~ with ~~an expressible polynucleotide~~nucleic acid construct including:

a polynucleotide capable of hybridizing under high stringency conditions to the nucleic acid of SEQ ID NO: 2, wherein said polynucleotide encodes~~ing~~ a polypeptide having an inorganic carbon fixation activity; and ~~bicarbonate transporter activity.~~

(ii) a plant promoter operable in directing transcription of said polynucleotide; and

(b) selecting from said photosynthetic plants of step (a) a photosynthetic plant comprising cells having at least 5% enhanced inorganic carbon fixation as compared to otherwise similar, non-transformed cells of said photosynthetic plants;

thereby obtaining the photosynthetic plant characterized by enhanced inorganic carbon fixation.

2. (Amended) The method of claim 1, wherein said ~~step of~~ transforming said cells of the photosynthetic plant~~organism~~ with said ~~expressible polynucleotide encoding said bicarbonate transporter~~ nucleic acid construct is effected by a method selected from the group consisting of genetic transformation and transient transformation.

6. (Amended) The method of claim 1, wherein said polypeptide having an inorganic carbon fixating activity is at least 90~~70~~ % homologous to SEQ ID NO:3 ~~or a portion thereof having said bicarbonate transporter activity~~ as determined using ~~the~~ Blast software where gap open penalty equals 11, gap extension penalty equals 1 and matrix is blosum 62.

8. (Amended) The method of claim 1~~7~~, wherein said photosynthetic plant is a C3 plant.

9. (Amended) The method of claim 8, wherein said C3 plant is selected from the group consisting of tobacco, tomato, soybeans, potato, cucumber, cotton, wheat, rice and barley.

10. (Amended) The method of claim 1~~7~~, wherein said photosynthetic plant is a C4 plant.

13. (Amended) The method of claim 1~~2~~, wherein said plant promoter is selected from the group consisting of a constitutive plant promoter, a tissue specific plant promoter and an inducible plant promoter.

16. (Amended) A nucleic acid construct~~molecule~~ for enhancing inorganic carbon fixation by a photosynthetic plant~~organism~~, the nucleic acid construct~~molecule~~ comprising:

(a) ~~-~~a polynucleotide capable of hybridizing under high stringency conditions to the nucleic acid of SEQ ID NO: 2, wherein said polynucleotide encode~~sing~~ a polypeptide having an inorganic carbon fixation activity; and

(b) a plant promoter being for directing nuclear transcription of said polynucleotide;

wherein expression of said polypeptide in cells of the photosynthetic plant results in at least 5% enhanced inorganic carbon fixation as measured in comparison to otherwise similar, non-transformed cells of the photosynthetic plant. ~~bicarbonate transporter activity.~~

19. (Amended) The nucleic acid construct~~molecule~~ of claim 16,

wherein said ~~polypeptide~~ polypeptide having an inorganic carbon fixating activity is at least 90~~70~~ % homologous to SEQ ID NO:3 ~~or a portion thereof having said bicarbonate transporter activity~~ as determined using ~~the~~ Blast software where gap open penalty equals 11, gap extension penalty equals 1 and matrix is blosum 62.

20. (Amended) The nucleic acid construct~~molecule~~ of claim 17, wherein said plant promoter is selected from the group consisting of a constitutive plant promoter, a tissue specific plant promoter and an inducible plant promoter.

21. (Amended) The nucleic acid construct~~molecule~~ of claim 20, wherein:

(i) said constitutive plant promoter is independently selected from the group consisting of CaMV35S plant promoter, CaMV19S plant promoter, FMV34S plant promoter, sugarcane bacilliform badnavirus plant promoter, CsVMV plant promoter, *Arabidopsis* ACT2/ACT8 actin plant promoter, *Arabidopsis* ubiquitin UBQ1 plant promoter, barley leaf thionin BTH6 plant promoter, and rice actin plant promoter;

(ii) said tissue specific plant promoter is independently selected from the group consisting of bean phaseolin storage protein plant promoter, DLEC plant promoter, PHSβ plant promoter, zein storage protein plant promoter, conglutin gamma plant promoter from soybean, AT2S1 gene plant promoter, ACT11 actin plant promoter from *Arabidopsis*, napA plant promoter from *Brassica napus* and potato patatin gene plant promoter; and

(iii) said inducible plant promoter is independently selected from the group consisting of a light-inducible plant promoter derived from the pea rbcS gene, a plant promoter from the alfalfa rbcS gene, DRE, MYC and MYB plant promoters which are active in drought, INT, INPS, prxEa, Ha hsp17.7G4 and RD21 plant promoters active in high salinity and osmotic stress, and hsr303J

and str246C plant promoters active in pathogenic stress.

22. (Amended) The nucleic acid construct~~molecule~~ of claim 16, further comprising a sequence element selected from the group consisting of an origin of replication for propagation in bacterial cells, at least one sequence element for integration into a plant's genome, a polyadenylation recognition sequence, a transcription termination signal, a sequence encoding a translation start site, a sequence encoding a translation stop site, plant RNA virus derived sequences, plant DNA virus derived sequences, tumor inducing (Ti) plasmid derived sequences and a transposable element derived sequence.

23. (Amended) A ~~transformed~~ transformed photosynthetic plant comprising ~~organism comprising~~ the nucleic acid ~~molecule~~ construct of claim 16.

26. (Amended) The transformed photosynthetic plant~~organism~~ of claim 23~~5~~, wherein said plant is a C3 plant.

27. (Amended) The transformed photosynthetic plant~~organism~~ of claim 26, wherein said C3 plant is selected from the group consisting of tobacco, tomato, soy-beans, potato, cucumber, cotton, wheat, rice and barley.

28. (Amended) The transformed photosynthetic plant~~organism~~ of claim 23~~5~~, wherein said plant is a C4 plant.

29. (Amended) The transformed photosynthetic plant~~organism~~ of claim 28, wherein said C4 plant is selected from the group consisting of corn, sugar cane and sorghum.

30. (Amended) The transformed photosynthetic plant~~organism~~ of claim 23, wherein said plant~~organism~~ is characterized by a photosynthetic rate at least 10 % higher as compared to a control non-transformed organism under otherwise identical conditions.